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Parallel Development of Products and New Business Models

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Abstract

The perception of product development and the practical execution of product development in professional organizations have undergone dramatic changes in recent years. Many of these changes relate to introduction of broader and more cross-disciplinary views that involves new organizational functions and new concepts. These changes can be captured in various generations of practice. This paper will discuss the recent development of 3rd generation product development process models and the emergence of a 4th generation. While the 3rd generation models included the concept of innovation and innovation management the 4th generation models are increasingly including the concept business models and business model innovation.

Keywords: *Business Models, Product Development, Innovation, Value Creation*

1 Introduction

The dominant view on product development processes has undergone a continuous development since the late 1950s [1]. However, the change in view seems to be more radical since the millennium. The so-called dot-com bubble lasted from the early 1990's to when the bubble busted around 2000-2001. A combination of new Internet-based companies and new ways of interacting with customers, users, and various business partners led to an exponential like equity value rise of the companies involved in various new ways of developing products and doing business. Companies experienced their stock value to explode if they simply added an "e-" prefix to their name and/or a ".com" to the end. Venture capitalists gained exceptional return on investment from record-setting growth as dot-com companies experienced exponential rises in their stock prices and therefore moved faster and with less caution than usual. In 2000-2001 the dot-com bubble collapsed and many new established companies failed completely. Others lost a great part of their market capitalization, e.g. Amazon.com, whose stock price went down from 107 to 7 \$ per share. However, both during and, in particular, after the dot-com bubble there has been a significant research focus on some of the phenomena that emerged and evolved during the period. One of the most significant phenomena is the focus on "business models" in parallel with focusing on the products and services innovation. Some business models proved to be not only innovative but also more important compared to the importance of sole product or service innovations. While most dot-

com companies failed and disappeared, some of the companies established during the period thrived and grew to be very large corporations, e.g. Amazon.com (May 2014 stock price 310 \$ per share) and Google. The purpose of this paper is to explore the close relationship between the development of business models and the development/innovation of products or services.

2 Product Development and Business Models

New business models will often emerge within companies that are in a growth or a restructuring phase. In many cases new and entrepreneurial companies will be based on new business models. In the 1950s, new business models came from McDonald's Restaurants and Toyota. In the 1960s, the innovators were Wal-Mart and Hypermarkets. During the 1970s new business models merged from FedEx and Toys'R'us; the 1980s from Blockbuster, Intel, and Dell Computer. These examples have all traditionally been analysed from a pure business perspective with less focus on the products or services that they deliver, i.e. a traditional marketing approach [2]. However, during the dot-com period it became evident that the relationship between the products and the business models needed to be more elaborated and explicit in order to understand the cases sufficiently.

2.1 Product Development Process Models

The developments of product development process (PDP) models have undergone radical changes in the past 50 years. In 1994 Robert G. Cooper wrote an insightful paper on this subject [1]. In the paper he defines three generations of PDP models.

The initial attempts to structure and formalize the product development activities were driven by the US military and the many large projects that suffered high failure rates [3]. NASA developed the first-generation of PDP models in the 1960s (in response to the challenge of putting a man on the moon). This model named Phased Review Process broke the development into discrete phases with review points at the end of each phase. The model was engineering-driven applying strictly to the physical design and development of the product. As so the model was developed to minimize technical risks (but not business and cross-organizational risks).

During the 1970s a number of authors warned that an increasing number of new products suffered high failure rates when entering the market. A number of publication estimated that between 30% and 90% of all new products could be categorized as failures [4]. The blame was in general attributed to the strictly technical view of the first generation PDP models. Consequently, the second-generation PDP models incorporated more cross-organizational elements.

The second-generation PDP models did also consist of identifiable and discrete stages preceded by review points or so-called gates. Marketing and manufacturing were now integral parts of the product development process. The decision points or gates were cross functional. Second generation PDP models include cross-functional decision-making, where the various cross-functional senior managers who own the needed resources sit together at a gate meeting and together decide on and commit to a project.

During the 1970s and 1980s most large corporations adopted variants of the second-generation PDP model. The model was implemented under different names: Concurrent Engineering, Stage Gate Model, Waterfall Model, and Integrated Product Development. Despite the different names the definition is largely the same: "Concurrent Engineering is a

systematic approach to the integrated, concurrent design of products and their related processes, including, manufacturing and support. This approach is intended to force the developers from initial phases of the project to consider all elements of the product life cycle, from conception to disposal, including cost, schedule, quality and user requirements” [5].

After the implementation of the second-generation PDP Model many companies acknowledged the cross-organizational approach but increasingly felt that the model was too rigid and inflexible. In the 1990s most companies experienced a pressure for speed to market, and the second-generation PDP model seemed to slow down the launch process due to the rather rigid structure. Consequently, many companies started to adapt the PDP model to fit better their internal structures and their specific external market conditions.

This led to the development of the third-generation PDP model. PDP models became individualized to each company and increasingly the term “innovation” emerged as a challenge to introduce an even broader intra- and inter-organizational approach to product development [7]. In his book from 2005 Cooper consequently replaced the term “Product development” with the term “Innovation” [8].

The process of adapting the second-generation PDP models to a third-generation model seems to have been both complicated and a considerable task for companies to accomplish. While companies were in the midst this development a new challenge emerged. As described in the introductory part there were indications that a parallel consideration or development of the business model associated with a product or service was needed.

The various challenges to the existing PDP models are still not fully incorporated in stable setups. As companies are finding ways of coping with the challenges there is an increasing feeling that the solution will emerge as fourth-generation PDP models that will integrate fully both the innovation perspective and the business model perspective.

2.2 Innovation Management

The term innovation can in the simplest form be defined as “the successful exploitation of new ideas” [7]. In this meaning innovation becomes a core process for any firm or organization in order to survive or prosper. Being a core process requires that it can be managed and organized as a systematic activity [9].

The important question is: How can we be supported in assessing, reviewing, and challenging the relevant competitive features of the current state of a given product or service?

This requires support from an innovation management model or framework. Every organization has to choose its own model or framework and make it an integral part of their overall management system. There are basically two approaches, 1) To develop a company specific model that fits the particular requirements within the relevant industry, or, 2) To choose a generic model that can be adapted according to the particular requirements within the relevant industry. The second option has several advantages. By choosing a generic innovation model it is easier to benchmark with other industries and companies; and due to the broader external documentation of the model it is easier to communicate internally within the company.

The Innovation Management approach differs significantly from the Product Development approach by emphasizing that an isolated focus on the technical aspects of a particular

product will be insufficient. In order to develop competitive and profitable products a number of supplementing aspects and viewpoints needs to be integrated [7].

2.2.1 Innovation models with multiple innovation viewpoints

There are several available generic innovation models that operate with multiple innovation viewpoints.

The Doblin Group studied a large number of innovation examples throughout the world. They identified ten main types of innovation and published their Ten Types of Innovation model in 1998. In 2011 the model was updated to reflect the experienced changes since launch of the original model [10]. The ten types of innovation are summarized in table 1.

Table 1 Elements of the Doblin Innovation Model [10]

Business Model	How the organizations make money
Network/alliances	How they join forces with others for mutual benefit
Enabling processes	How their core processes and workers are supported
Core processes	How they create and add value to offerings
Product performance	How they design core offerings
Product systems	How they link or provide a platform for multiple products
Services	How they provide value to customers beyond and around products
Channels	How they get offerings to market
Brands	How they communicate offerings
Customer experience	How customers feel when they interact with a company and its offerings

Sawhney, Wolcott and Arroniz identified 12 different ways for firms to innovate [11].

Francis and Bessant identified four ways of targeting innovation – the so-called 4P model [12]. The model has been refined frequently by updates in various articles and Innovation Management books [7].

Verganti identify three different approaches to innovation [13]. The particular contribution from this research is that Verganti document that the languages that are related to the different approaches differ. Companies would use different methodologies according to their choice of approach and this will impact the way they communicate with their customers, competitors, and network partners [13].

The four models have a lot of similarities. However, the most important shared conclusion is that innovation is not a matter of product innovation in an isolated way. Their research document that isolated product innovation is not likely to be successful compared to an innovation effort that involves several viewpoints of innovation. Doblin has documented this in quantitative studies that compare the companies' innovation efforts and the associated cumulative value creation (see figure 1) [14].

The studies from Doblin demonstrate that the value created by innovation efforts in the last decade has come from finance, delivery, and process categories. The process category effects are explained by the existence of structured innovation approaches, and the delivery category effects are explained by an increased emphasis on customer-facing operations. However, the most significant value creation is explained by a parallel focus on business models and

improvement of networking activities with potential partners. Though less value is created by the offering category this is not an indication of less importance. This category is just seen as a qualification requirement that has to be fulfilled [14].

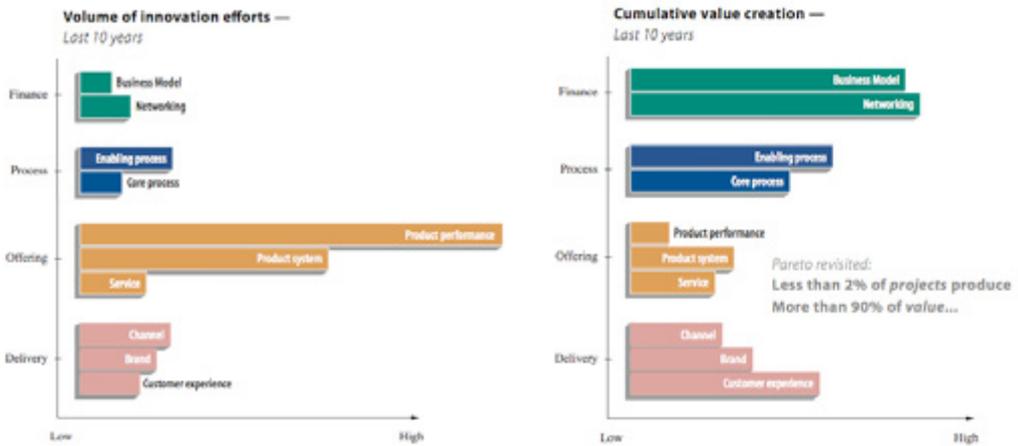


Figure 1 Comparison between innovation effort and cumulative value creation [14]

2.3 Business Models

The term ‘business model’ has predominantly been connected with e-business, as the application of the Internet has caused a minor revolution in possible ways of doing business – in essence creating an array of new business models [15]. A major focal point of the literature on business models from an e-business perspective has been how to migrate successfully to profitable e-business models. Although the present focus on business models within academic and practitioner circles can be related to a great extent to their discussion within an e-business context, the importance of applying a business model focus is far from only applicable to this sector.

A business model is a sustainable way of doing business and business models are implicit to any business or organization, and have always been. Sustainability in a business model stresses the ambition to survive over time and create a successful, perhaps even profitable, entity in the long run. Sustainability is here interpreted as the propensity to survive and thus also the ability to stay competitive. As such, a business model cannot be a static way of doing business. It must be developed, nursed and optimized continuously in order for the company to meet changing competitive demands. Precisely how the company differentiates itself is the competitive strategy, whilst it is the business model that defines on which basis this is to be achieved; i.e. how it combines its know-how and resources to deliver the value proposition [16].

2.3.1 Why focus on Business Models?

A business model is the company’s underlying concept of value creation, which ultimately leads to profits and long-term sustainability.

Osterwalder offers a strategic reason to why companies should focus on the business models: “Business models have two essential functions. First, they allow managers to talk about possible implementations of strategic objectives and understand the relevant issues. Secondly,

an appropriately formulated business model can help managers easily express what they expect from people on the business process level or from technically oriented people” [17].

The strategic perspective is important but only one aspect of the need to focus on business models. Technology is not to be underestimated within the business model concept, as it is a key element in determining which organizational structures become profitable and can be realized [18].

2.3.2 Business model innovation

In a more operational perspective the development of new competences and application of new technologies will be crucial to future competitive advantage and survival. Therefore, innovation, with regard to technology and business model concepts is still an indispensable aspect of the business model discussion. For example, competition in the logistics industry has been changed drastically in recent years through the introduction and the utilization of information technology. Illustrating how these changes have lead to closer collaboration between companies and their logistics partners it makes sense to talk of a whole new business model. Dell is an outstanding example of how a company has refined and extended an existing business model with information technology. With the unique value proposition of its direct sales and built-to-order business model, Dell has managed to influence how a whole industry does business [18].

In order to facilitate the cross-organizational discussions on business model innovation it is often an advantage to be able to visualize the current or future business models. One such idea on how to visualize the business model is the popular Business Model Canvas by Osterwalder & Pigneur [19]. As can be seen in figure 2 the Business Model canvas contains many similar elements compared to the Doblin Innovation Model [10].



Figure 2 Business Model Canvas [20]

3 Case on product and Business Model innovation

The case is an excerpt of a larger study – The International Center for Innovation (ICI) - conducted at the Center for Industrial Production, Aalborg University from 2008-2013. The ICI project was structured in 10 networks, each consisting of at least five independent partners. In total more than 100 individual organizations participated in the study [21].

3.1 Eye In the Sky

The project started as a typically technology driven project aiming at developing an autonomous helicopter (a drone). Originally, the product was intended to support the difficult task of seeking landmines in war-torn areas and was requested by DanChurchAid's Humanitarian Mine Action group, a Danish NGO. DanChurchAid had vast experience in landmine seeking and landmine removal, and accordingly provided knowhow.

Relatively quickly they rejected the sustainability side of the idea because their experience told them that such areas often were often prone to heavy competition. Instead, they identified a need for aerial photography to map out areas and creating an automated overview. These data are often outdated or non-existing for landmine-infested areas.

Combining the idea of an airborne mine-seeker and the demand for areal photos spawned the idea of a small versatile unmanned drone helicopter, which could take aerial photos of the minefields. Having the project defined, the notion of a pure network-based business model (a network of equal partners) was initiated by identifying, which key resources and activities were necessary for developing, producing and manufacturing the drone helicopter. Five partners were identified. All of the five companies had a natural interest in the project because their individual contributions were similar to what they were already doing in their existing businesses and at the same time it was not competing with their existing market.

Based on this idea, they set out to create the prototype, in which they succeeded. The next stage was to get a test customer. Yet relatively quickly, they discovered, that the customer segment comprising of "NGOs" were a tough nut to crack, even though they had DanChurchAid as a partner and advocate.

The network of basically equal partners made it difficult to change direction. It was impossible to specify requirements for the final product as the potential final solution required very different features.

The basis for the discussion slowly changed from the being the technical features to be focusing on the business model. This provided a totally different picture of the challenges and the discussion on how to comply with these challenges took a different direction. Basically, the team asked themselves whether they could developed the drone into a platform that would allow new partners to develop assessories that would fit their application requirements. The extended partner base would finance they own development activities and would be driven by the prospect of getting a better share of the potential profit.

The change in the way of defining the core offering of the company have significantly change the whole way of operating the product development activities. Product development activities are now seen in parallel with business model development and innovation potentials and needs.

4 Reflection

The parallel development of product development models, innovation management model, and business innovation models appear to converge towards a new more comprehensive understanding of product development processes.

The traditional product development models builds on the assumption that all parameters of a given problem can be thoroughly defined and mapped before proceeding with designing the

solution. When complexity increases the traditional approach is generally not applicable. The problems are not easily defined and the interplay between solutions and problems become dynamic in nature.

Traditional product development model are best described as sequential methods. When combining traditional methods with multiple cross-disciplinary view models a more iterative approach emerge [22]. By taking an iterative approach, the parameters of the problem and possible solutions may be explored simultaneously. The iterative approach means that the process can start without preconceived problem definitions. An emerging potential solution might shed new light on the perception of the problem.

One interpretation is the traditional product development models rely mainly on analytical thinking whereas the more iterative methods rely mainly on synthesis. The terms analysis and synthesis come from Greek and literally mean “to loosen up” and “to put together” respectively. In general, analysis is defined as the procedure by which we break down an intellectual or substantial whole into parts or components. Synthesis is defined as the opposite procedure: to combine separate elements or components in order to form a coherent whole. However, analysis and synthesis, as scientific methods, always go hand in hand; they complement one another. Every synthesis is built upon the results of a preceding analysis, and every analysis requires a subsequent synthesis in order to verify and correct its results [23].

The dynamics in the market seems to explain the problems that the traditional product development models are facing. When dynamics increase the risk of not developing products and business in parallel increases as well. This relationship is illustrated by figure 3. Every innovation basically carries two risks – a technology risk – Will it work? And a marketplace risk – Will people buy it? The technology risk involved in going after breakthrough products is inherently high. Similarly, innovation on the business model side doesn't incur much technology risk when limiting the degree of radicality of the innovation [24].

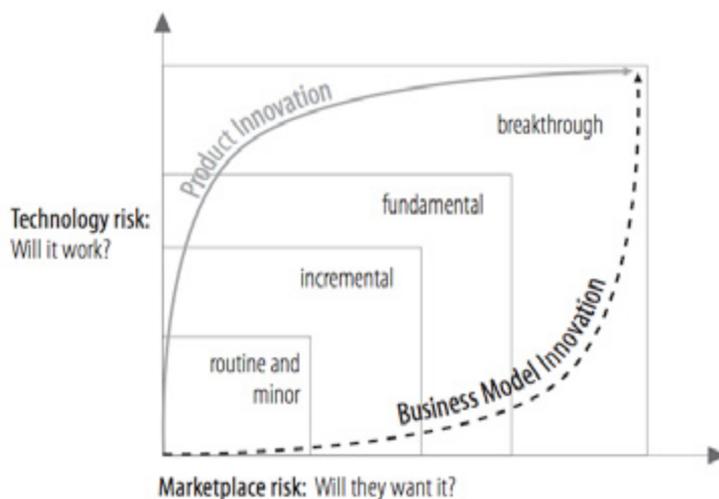


Figure 3 The Risks of Innovation [24]

The insight from figure 3 is in consistence with the findings from ICI project [21]. The companies and networks that succeeded in their efforts were the ones that adapted a parallel approach to their innovation activities.

However, the project also found that there is a significant lack of systematic tools and methods to support this parallel approach. In the cases where the companies succeeded they had to adopt a seek and learning process in order to proceed.

The recently launched methods to support multiple viewpoint innovation and business model innovation do support to certain degree. However the models are still considered to be too abstract and conceptual. It is striking that the contributions from two authors that currently get the most attention, Steve Blank and Eric Ries, are very sporadic [25, 26]. Both contributions rely on tested methodologies but the written documentation is still only slowly maturing.

Recent research with the business model innovation literature emphasize information overload and the problems of communicating complex business models [27]. In order to overcome these barriers narratives proves to be efficient to promote both communication and involvement [21].

5 Conclusion

The paper has discussed the development of product development models towards more comprehensive and cross-disciplinary processes. The most recent development is the inclusion of business model development and business model innovation as a parallel element of product development processes. There are still no integral approaches but the need to design a framework for co-creating products and business models as an interrelating process is evident. The case study clearly revealed that when introducing business model design to the process, the potential business success was increased, and this gave the company valuable input to the product development process, starting an on going unstructured interrelating process. The challenge is to structure this parallel process, with defined triggers were the business model canvas building blocks serves as the business model framework and become integrated in the product development process. These changes in our perception and product development practice will likely lead to a new generation of product development models.

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